Twisted Pair Solutions

WAVE software manages real-time, secure, group communications over the IP network, linking in people and devices.

WAVE

WAVE Components At A Glance

- The **WAVE Management Server** configures and administers a WAVE system.
- The **WAVE Media Server** is WAVE's media processing engine.
- **WAVE Channels** represent logical groupings of devices. Channels are stable structures created when the system is initially configured.
- **WAVE Sessions** tie other WAVE components together to perform a specific function. Sessions live on Media Servers and may be created on the fly.
- The **WAVE Desktop Communicator™** lets users access a Channel from a PC. It can run in a web browser.
- The **WAVE Dispatch Communicator™** is used by radio dispatchers to manage multiple simultaneous conversations.

How WAVE™ Works

Managing Secure, Real-time, Group Communications

Twisted Pair Solutions' WAVE (Wide Area Voice Environment™) software technology enables and manages real-time, secure, group communications over the IP network, linking people and devices. WAVE connects people who are using disparate and often incompatible communications technologies—such as two-way radios, personal computers, cell phones, and IP phones—into a single, interoperable and manageable communications system via standards-based IP communications technology.

WAVE technology consists of software building blocks and development tools designed around a simple and elegant concept: convert all forms of communication to IP packets, use the network to carry those packets between endpoints, and build distributed intelligence and management capabilities at the network edge to connect the endpoints together.

The company's patent-pending technology converts communications from individual users' devices into group-level IP packets that can be forwarded to other devices and users. Once brought into a WAVE domain, these interoperable communication sessions are subject to management and security controls, and may be bridged, recorded, joined into conferences, or routed to devices outside of the system. WAVE is media agnostic with both voice and data media types currently supported. In addition, status, presence and adaptive transport network management provide for rich collaboration among group communications participants. The result is that groups of people can talk and share real-time data, with full control, regardless of the devices or systems used.

With audio data converted into IP packets and streamed across the network, a new set of devices can directly link together and participate simply and easily in critical communications. Careful use of IP multicast, QoS, and transcoding technology minimizes network bandwidth requirements. All of your devices, endpoints, and configurations are presented in clean, understandable, and manageable user interfaces.

Plus, since all WAVE systems are built from just a few modular components, you can configure them in an infinite number of ways to meet the unique requirements of your organization.

The key to enabling secure, real-time group communications: standards-based software, not proprietary hardware

Building Your WAVE System

Every WAVE system begins with at least one **WAVE Management Server**, a web application that configures the system. All WAVE components are administered using the WAVE Management Server, and the collection of WAVE components controlled by a single WAVE Management Server is called a WAVE Domain.

While you must have the WAVE Management Server to setup other WAVE system components, a WAVE Domain can run as a "headless" peer-to-peer system if the WAVE Management Server is disabled for any reason. This feature improves the survivability of WAVE systems in extreme environments, such as combat situations.

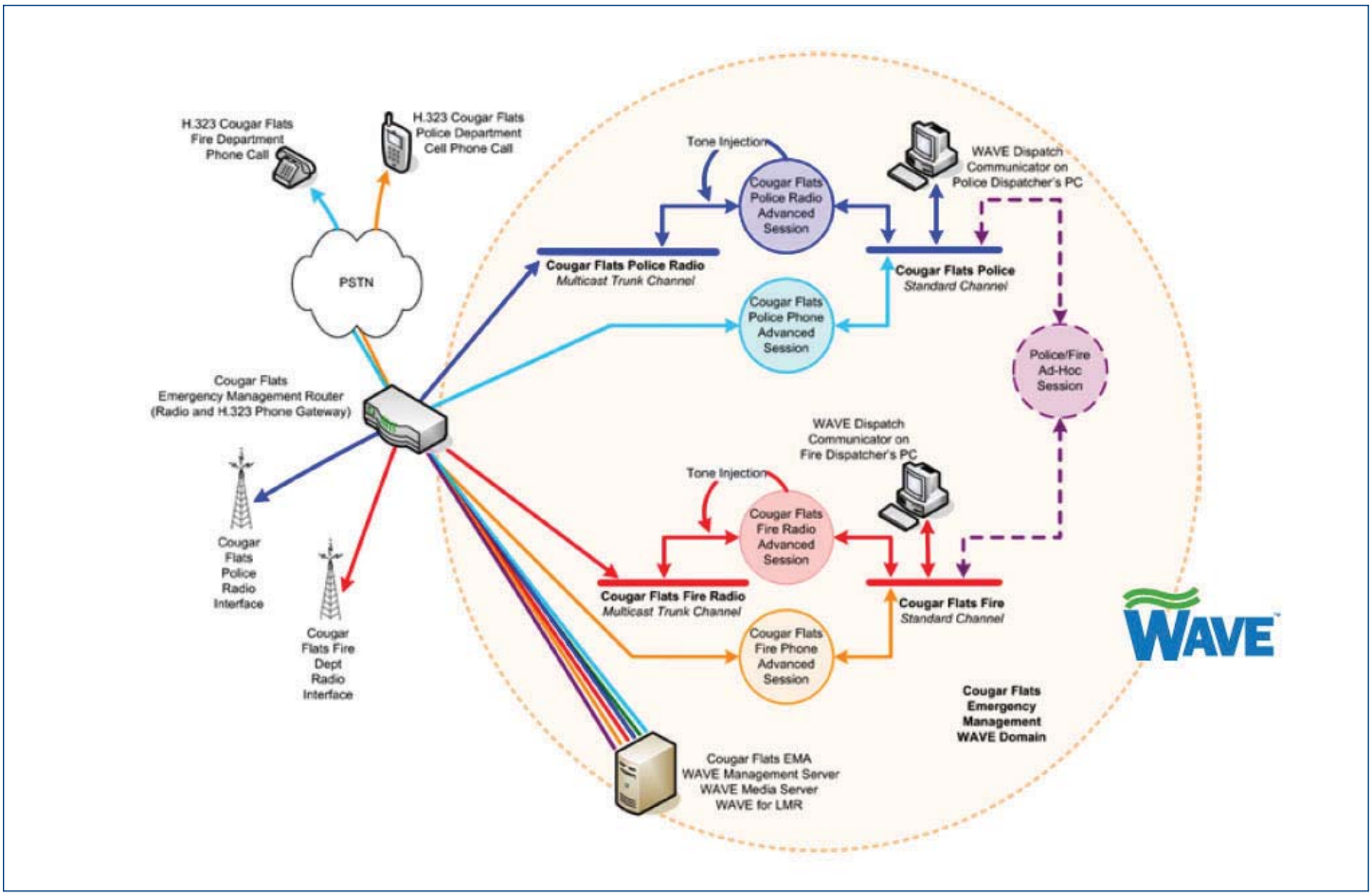
Next, the **WAVE Media Server** acts as a media processing "engine" for the system, performing digitizing, mixing, and audio transcoding. The WAVE Media Server software runs as a service on any Windows PC, and in small WAVE systems, a PC acting as a WAVE Media Server can even pull double duty—also acting as a print server, for example. Large installations may have multiple WAVE Media Servers, which can be located over wide geographic areas and connected via your WAN, the public Internet, or a VPN. The distributed servers enable you to make local dial-in connections to globe-spanning WAVE conferences, or connect geographically dispersed radio transmitters for better coverage.

WAVE Desktop Communicator lets PCs join with phones and radios in a WAVE conference. You need to add only a microphone and a pair of speakers to your PC. The WAVE Desktop Communicator is available in two different versions: a standalone Windows program and a program run in a web browser. Both are lightweight and don't use significant PC resources, so you can carry on a conversation while getting other work done. The WAVE Desktop Communicator lets you change radio channels, instant message other users, record conversations, see who is talking, adjust audio signals, and speak over WAVE channels.

The **WAVE Dispatch Communicator** is a powerful front-end interface used by system operators to manage multiple simultaneous communications channels, to route fire trucks, taxicabs, or soldiers, for example. With the WAVE Dispatch Communicator, you can replace an entire hardware dispatch console with a laptop computer and a microphone headset.

WAVE Channels are logical components used to group communications devices in the system. Channels often contain related devices, like "all the police radios" or "all the phones on the second floor." There are several different kinds of WAVE Channels, each specialized for distinct roles. Most commonly used is the "Standard Channel," which allows human-operated devices like phones and PC clients to participate in WAVE. "Trunk Channels" connect non-user components, such as the WAVE Media Servers and hardware gateways. Other types of Channels are used for multiplexing, IP phone paging, and various special tasks. Channels have distinct transmit and receive "ends," identified by unique IP addresses, so they act like throughways for signal traffic.

WAVE Sessions join devices together in an audio conference. Sessions can be used to form tactical associations created on the fly when needed, unlike Channels, which are usually created when the system is initially configured. Sessions are very flexible and can group together different devices, entire Channels, or other Sessions. A session participant can be any type of device, including a WAVE Desktop Communicator, a two-way radio user, or a phone caller.



"Cougar Flats" WAVE Deployment

There are several types of specialized WAVE Sessions. "Meet-Me Sessions" create simple dial-in conferences. "Group Call Sessions" create conferences by having the Media Server make outbound calls. These make a great foundation for emergency notification, intercom, or Hoot and Holler systems. "Channel Access Sessions" let dial-in telephone users connect to a WAVE Channel. "Advanced Sessions" are the most sophisticated. These can perform special tasks, like sending control tones to radios. Plus, WAVE can record, store, and playback audio for any type of Session.

Putting the Components Together

To illustrate how the components of a WAVE system work together, consider the example of the Emergency Management Authority (EMA) of the hypothetical town of Cougar Flats, Nebraska. The EMA handles all police and fire communications, but as in many other municipalities, the police and fire departments have different radio systems that are unable to communicate with each other, which causes problems when they need to work together. Rather than invest in new radios for all users, the town deployed a WAVE system.

With the WAVE system, police and fire communications now share the same router and network, but maintain separate dispatchers and radio channels. This is important because these organizations need to maintain their autonomy and keep using their existing radios.

A single PC hosts the WAVE Management Server and WAVE Media Server. Radio traffic is digitized by the router, and then made available on two multicast trunk channels. Tone injection is configured so the dispatchers can send channel changes and high/low power signals to the tone-controlled radios.

WAVE can easily send two different sets of tones to the two different radio systems. When needed, phone calls can also be digitized by the router and bridged to a radio channel. Police and fire dispatchers control their communications from PCs using the WAVE Dispatch Communicator.

When the fire and police departments need to communicate on a major incident, either dispatcher can bridge radio channels in seconds by creating an ad-hoc session. The communications remain bridged as long as needed, and then normal operations can be restored just as easily. The two departments can talk when needed without changing radios or installing new gear in their mobile units, and the dispatchers retain control over their own department's communications.

How WAVE is Sold

WAVE comes in two versions: **WAVE for LMR** is designed for radio interoperability, and **WAVE for Hoot and Holler** works well for financial networks. WAVE is specified, sold, and maintained by WAVE certified resellers. Twisted Pair Solutions develops and tests WAVE, and trains and supports their channel partners. When a WAVE reseller makes a sale, a WAVE Certified Engineer performs a site visit and creates a logical WAVE diagram, similar to the one in this document.

The reseller lists all the WAVE components required to complete the system, orders the appropriate licenses and any other required hardware or software components, recommends network upgrades when needed, then revisits the customer and installs the system. Installations typically include network design, service labor charges, training, an ongoing maintenance agreement, and technical support.

Find Out More

To learn how WAVE can enable group communications for your organization, please contact your authorized WAVE reseller, or visit Twisted Pair Solutions on the web at **www.twistpair.com**.

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